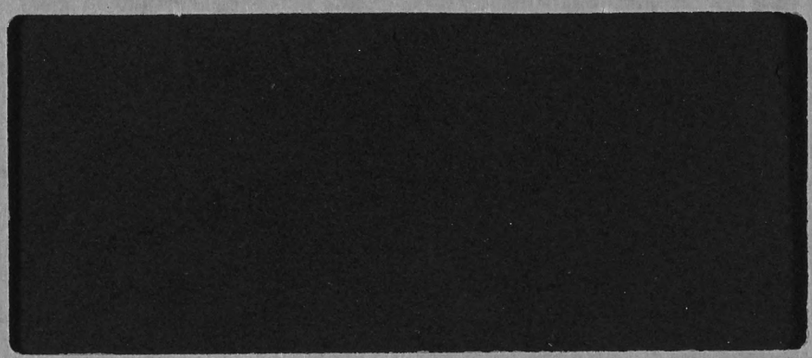
Annette Ainslie

DESK & DERRICK CLUB OF CALGARY

KANANASKIS - COLEMAN FIELD TRIP

JUNE 26 & 27, 1954



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We are indebted to the many people who have aided in the tasks preparatory to the Desk & Derrick Field Trip and the publication of the guide book.

The list of names is too long to publish but the individuals concerned can be assured that their efforts are sincerely appreciated.

We feel special acknowledgement is due the following geologists who supervised the operation:

Bill Clow	-	Amurex
Gordon Scruggs	-	Amerada

assisted by:

Denny Duff	-	Amurex
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Dallas Bossert	-	Texaco
Ruth Thompson	-	Socony
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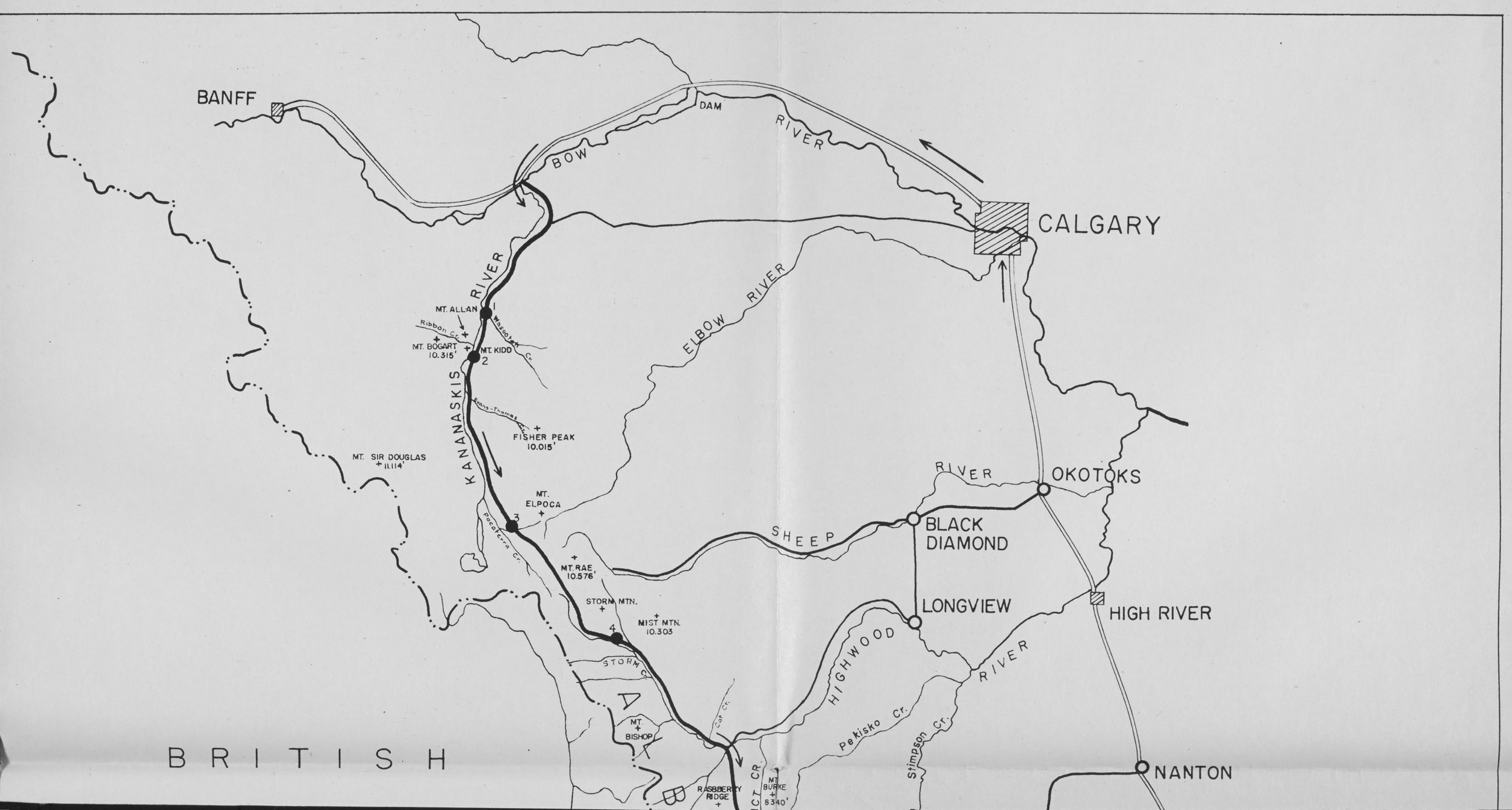
Also special thanks to The California Standard Company for supplying the materials, printing and binding of this book.


BANFF
DAM
BOW
RIVER
CALGARY
KANANASKIS
RIVER
MT. ALLAN
Ribbon Cr.
MT. BOGART
10.315'
MT. KIDD
Wasootch Cr.
Kiwa-Thomas Cr.
FISHER PEAK
10.015'
ELBOW RIVER
MT. SIR DOUGLAS
+ 11.114'
MT.
ELPOCA
Pocaterra Cr.
SHEEP
RIVER
OKOTOKS
BLACK
DIAMOND
MT. RAE
10.576'
STORM MTN.
MIST MTN.
10.303
LONGVIEW
HIGH RIVER
STORM Cr.
HIGHWOOD
RIVER
MT.
BISHOP
Carr Cr.
Pekisko Cr.
Stimpson Cr.
NANTON
BRITISH
RASBERRY
RIDGE
MT.
BURKE
+
8340'

COLUMBIA

RASSBERRY RIDGE +

MT BURKE + 8340'

CATARACT

BRITA

5

PLATEAU + MTN.

ISOLATED PEAK +

BEEHIVE + MTN.

OLDMAN RIVER

LIVINGSTONE R.

LIVINGSTONE RANGE

WILLOW CREEK

CLARESHOLM

TORNADO + MTN.

SUGAR + LOAF MTN.

Dutch Cr.

THUNDER + MTN.

TROUT CR.

6

GOULD + DOME

Racehorse Cr.

VICARY + MTN.

MABUTTE +

CROWSNEST + MTN.

McGILLIVRAY

ELK RIVER

CROWSNEST PASS

COLEMAN

8

BLUFF MTN.

BLAIRMORE

9

RIDGE

TURTLE MTN.

CROWS NEST RIVER

CASTLE

OLDMAN R.

RIVER

MACLEOD

PINCHER CREEK

WATERTON RIVER

BELLY RIVER

ST. MARY R.

CARDSTON

CASTLE R.

Foothills Cr.

LEGEND

- Route
- Stop
- Mountain Peak
- Prov. Boundary
- Main Road
- Secondary Road
- Main Prov. Road

DESK & DERRICK CLUB

FIELD TRIP ROUTE

JUNE, 1954

Good Morning Ladies!

Your 1954 weekend field trip down the Kananaskis-Coleman road takes you through a portion of the mountains made accessible by a forestry road engineered and built in the last few years by Eastern Rockies Forest Conservation Board.

The index map on the preceding page illustrates the routes, stops, mountains, creeks and lakes.

Shortly after leaving Calgary, you will note gravels in the road cuts. These gravels were deposited by glaciers. Ten miles out of town the road leaves the glacial deposits and proceeds to Cochrane along a preglacial plain. Going down the Cochrane Hill, on the right, rocks of Edmonton-Paskapoo age have been bared. There is an old brick kiln on the right of the road just west of Cochrane.

Four miles west of Cochrane the faulted zone of rocks which lies in front of the main mountain thrust begins. From this point on to a point two miles beyond Barrier Dam the rocks are of Cretaceous age.

Seven miles beyond Cochrane, the Wildcat Hills may be seen to the right. Twelve miles from Cochrane, the road crosses the Ghost River Bridge. The Ghost River dam is on the left at this point.

Eight miles beyond the bridge the entrance to the Stony Indian Reserve is on the left. Twelve miles beyond this point the road to Seebe dam is on the left. Mt. Yamnuska is on the right.

The Seebe dam is located on the Bow River at a point where channelling is caused by the sandstones of the Bighorn (Cardium) formation. Exposure of the Bighorn may be observed below the dam.

The road now enters the valley of the Kananaskis. For our purpose, mile zero (0) will be the Seebe bridge. At Mile 5 the Kananaskis Forest Reserve is entered. At Mile 7.5 the Barrier dam is at the right and on the left is a Forest Experimental Station which is a converted Prisoner of War camp. Cambrian rocks form the cliffs on the west of the dam.

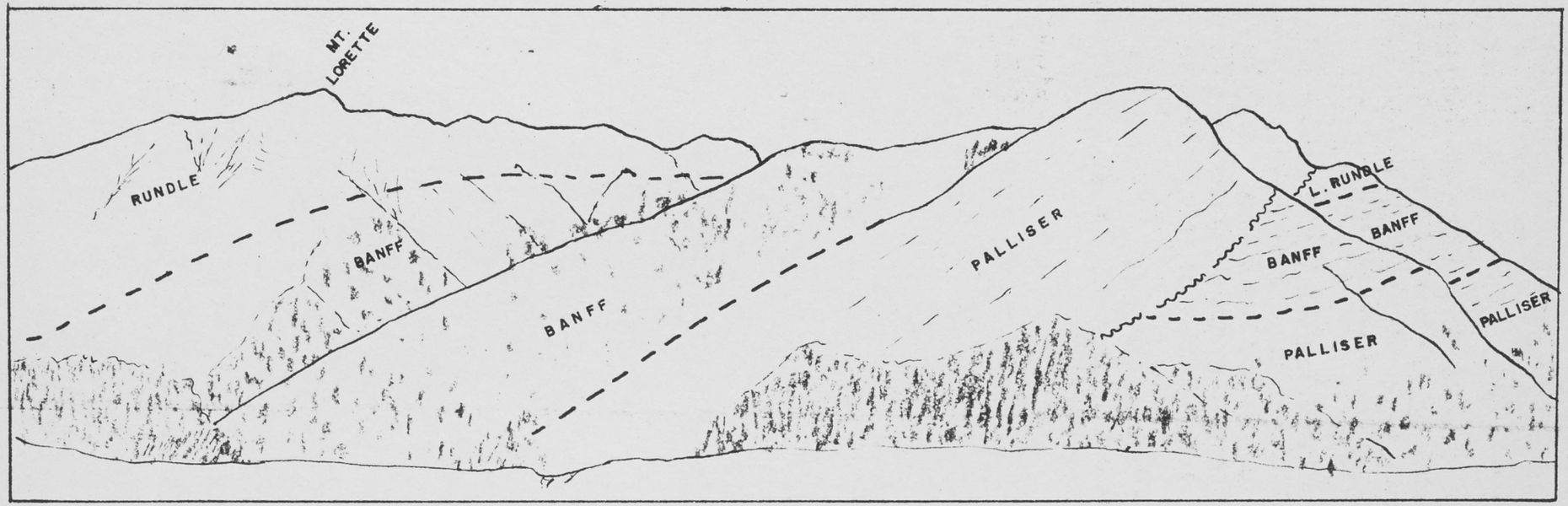
The prisoners were employed in projects related to the forest industry.

At 9.5 miles the road turns sharply left and climbs a long steep grade. This is the point where the McConnell thrust fault is crossed. The sediments from this point to Stop 1 (13.5 miles) are Paleozoic in age.

STOP 1 - Henk Worsie

From Stop 1 to Stop 2 (Mile 17) the sequence of Paleozoic rocks continues. Note the names of mountains on the index map.

Stop 2 is at Ribbon Creek.


MT. LORETTE
RUNDLE
BANFF
BANFF
PALLISER
L. RUNDLE
BANFF
BANFF
PALLISER
PALLISER

STOP NO. 1

STOP 1 - Wasootch Creek - Henk Worsie

To the west is Mount Lorette. The section at the top is Rundle limestone, underlain by Banff. The underlying Devonian section, Exshaw, Palliser and Fairholme, and the Lac des Arcs fault at the base are not visible from here. They are concealed behind the closer ridge in front of it.

Immediately to the right is another faultblock. At the base of the massive light gray cliff forming Palliser is the Exshaw fault, or rather the continuation of the fault by that name in the Bow Valley. The Palliser is seen twice at the skyline. It is topped by Exshaw shale and soft rusty weathering Banff. The latter shows as a smooth horizontal slope on the skyline.

To the far right another faultblock is visible. The base of it is concealed and further to the right. Here a continuous, though locally contorted, section from Palliser to lower Rundle is exposed.

STOP NO. 2 - RIBBON CREEK AREA - W. H. A. Clow (Description by Gordon Scruggs)

The Kananaskis valley at this point is underlain by an assemblage of Mesozoic strata similar to those occurring in Bow valley at Canmore or Anthracite. Of particular interest are the coal seams which outcrop on the lower slopes of Mt. Allan. They are an extension of the same coal measures mined by Canmore Coal Co. beneath the Three Sisters. Prospectors since the turn of the century had opened numerous coal seams in this area but it was not until 1947 that operations on a large scale were undertaken. Brazeau Collieries opened a strip mine on the lower slopes of Mt. Allan and in 1948 underground mining was commenced. Operations have been suspended during the last few years because of high transportation costs. The coal was hauled by truck to the rail near Seebe.

During World War II, inmates of the Prisoner of War Camp at Seebe were employed cleaning up fire-killed timber for mine props. As a result of these operations, numerous trails and access roads can still be seen on the lower slopes on both sides of Kananaskis valley.

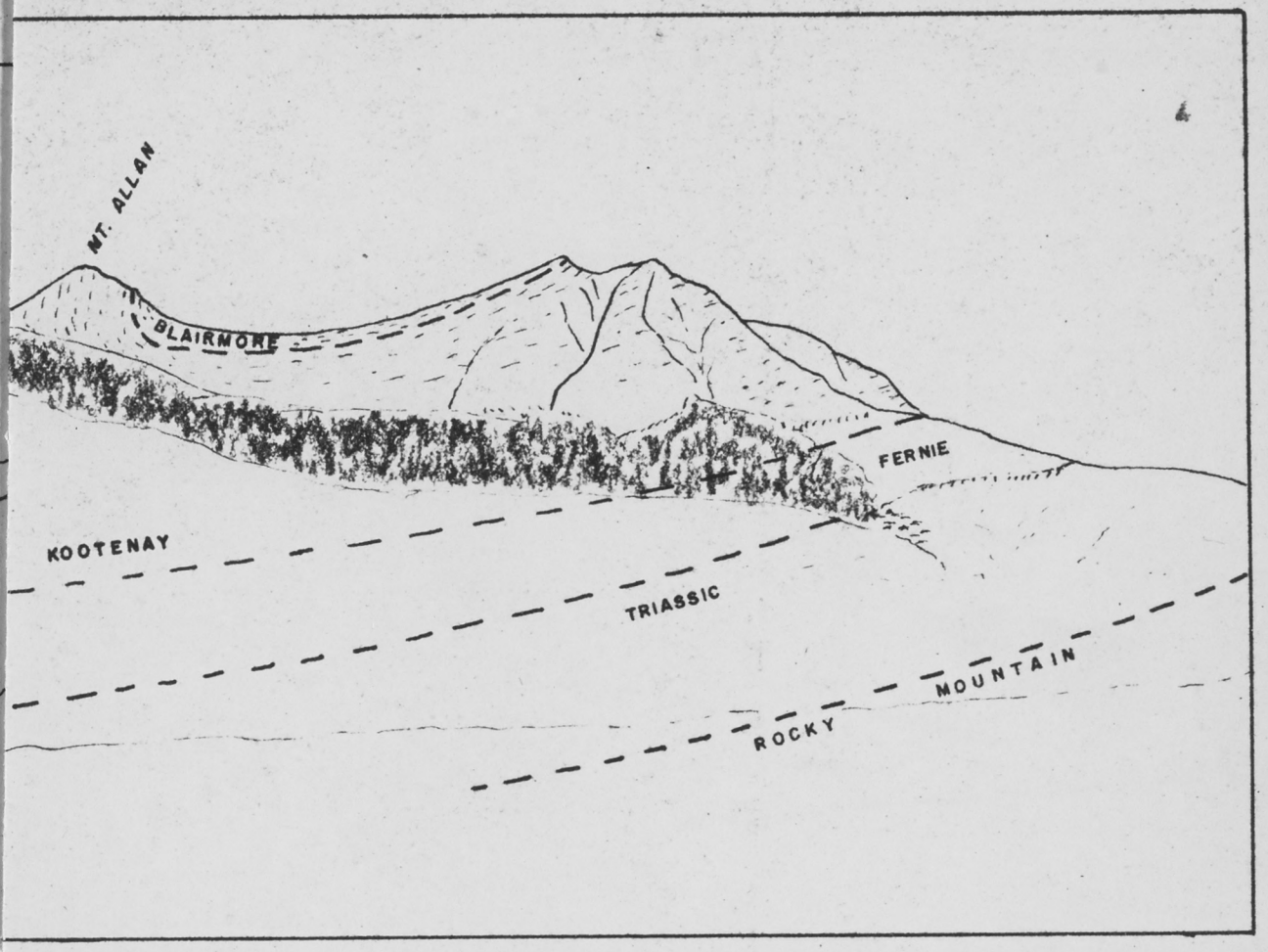
Observations:

(1) Mt. Allan lies on the west side of Kananaskis river. It is composed of Lower Cretaceous Blairmore and Kootenay sandstones and shales. This is the highest elevation (9,150') of these beds in Alberta. The cliff-forming ridges on the upper slopes are composed of the Basal Blairmore conglomerate. These beds outline very nicely the synclinal nature of the Blairmore beds above, and the uppermost Kootenay beds. Down along the subdued, forest covered slopes of Mt. Allan, the Kootenay coal measures and beds of Jurassic and Triassic age also outcrop. The Triassic can be seen in small cliffs near the base of the slope, and along Ribbon Creek at the outcrops a few hundred feet above the logging camp buildings.

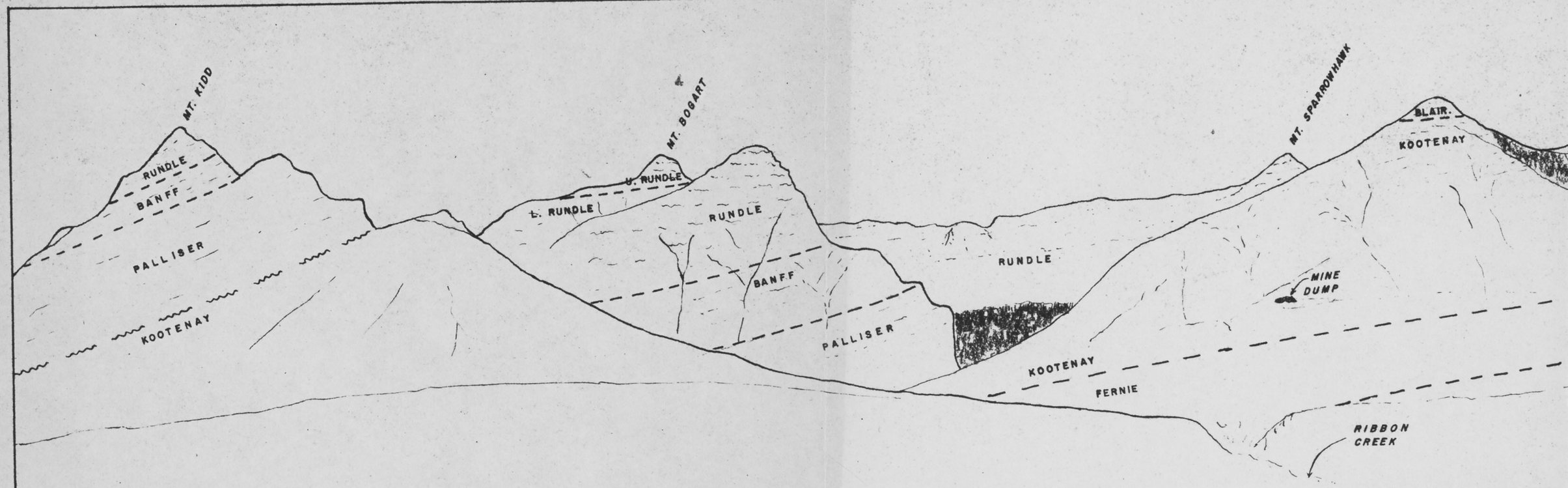
(2) South of Mt. Allan, along the higher limestone peaks of Mt. Sparrowhawk, Mt. Bogart and Mt. Kidd, Mississippian and Devonian rocks have been overthrust onto Kootenay. The highest cliffs are lower Rundle; the more gentle slope below is Banff and Exshaw; while the massive cliffs above the grass and timber covered slopes are Palliser or Upper Devonian.

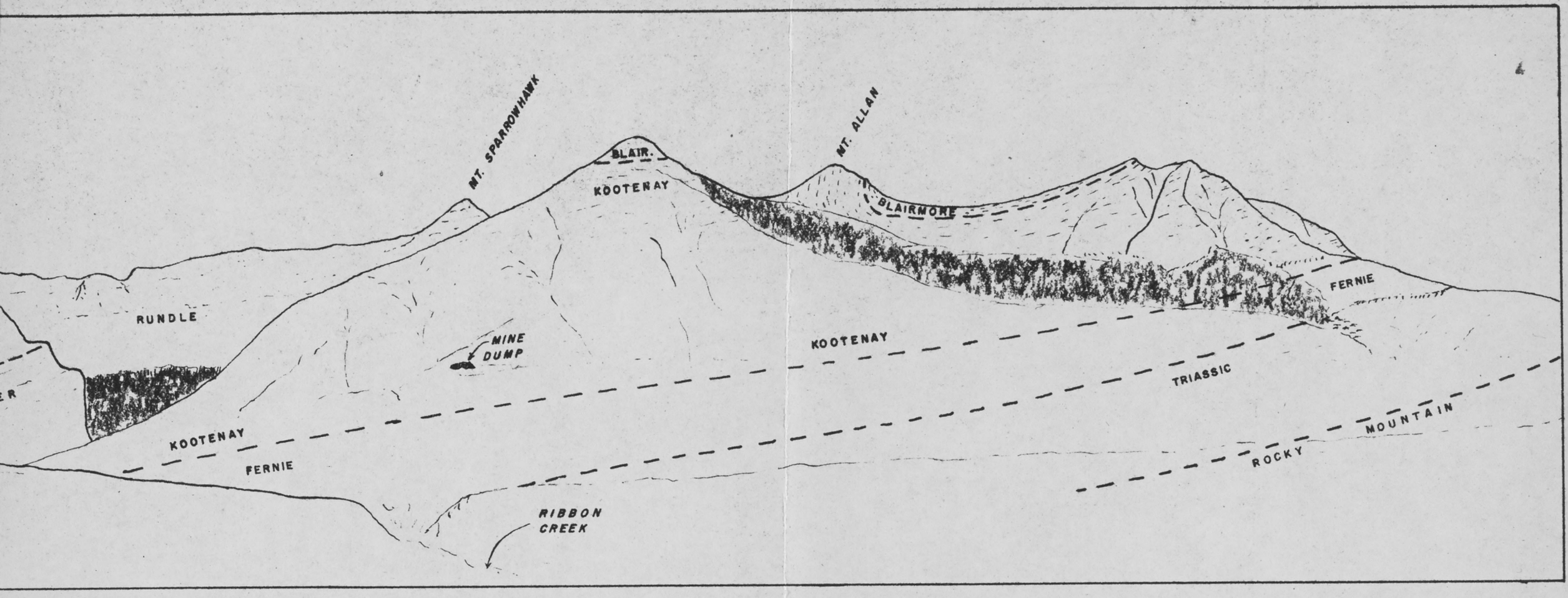
(3) On the eastern sides of the valley on the dip slope of Mt. MacDougall, the Rocky Mountain formation of Pennsylvanian age and some Triassic knobs can be observed.

From Stop 2 going southward at Mile 18 the highway passes through the Kananaskis Forest Reserve gate.

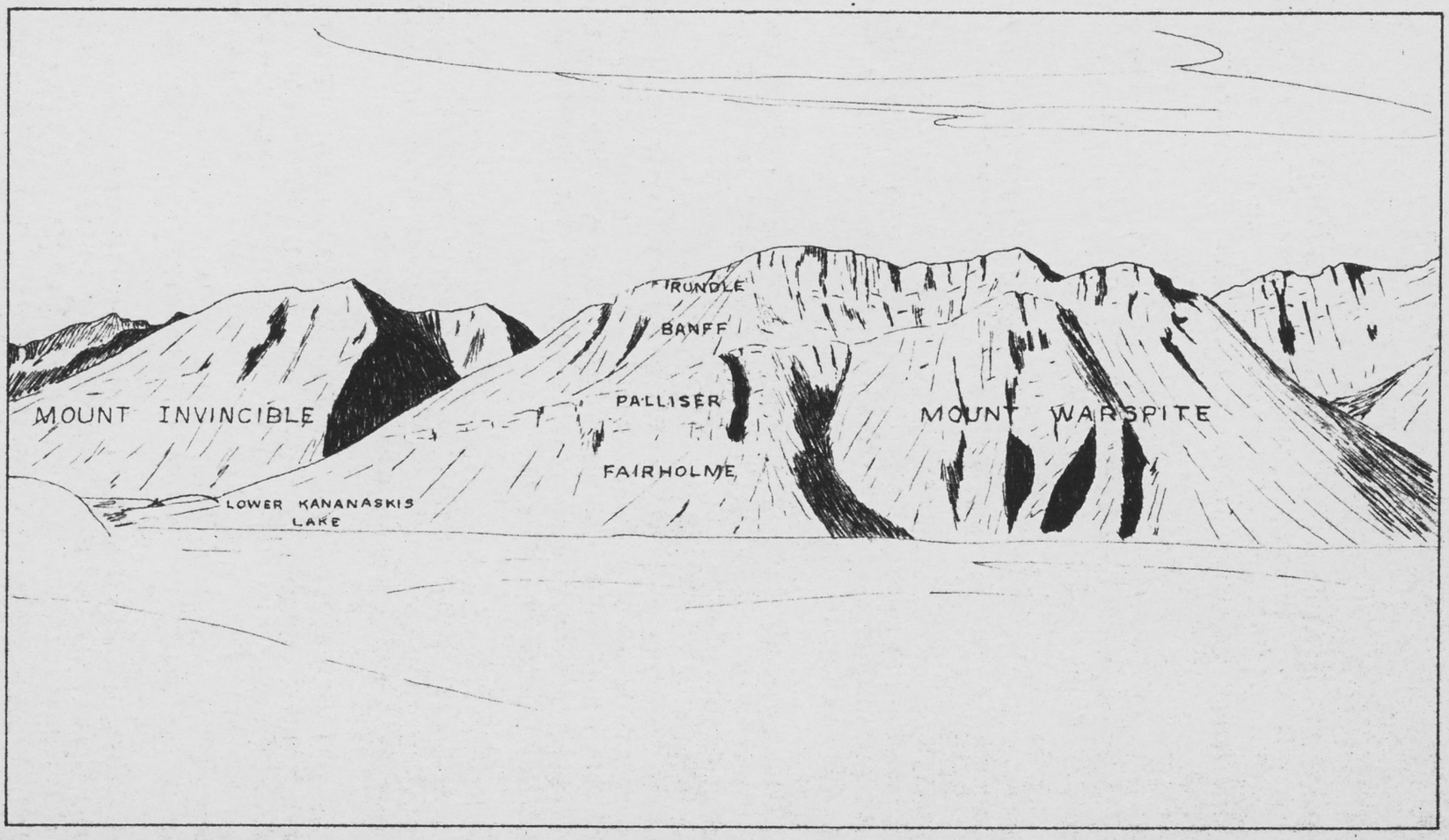

MT. ALLAN
BLAIRMORE
FERNIE
KOOTENAY
TRIASSIC
ROCKY
MOUNTAIN

STOP NO. 2


MT. KIDD
RUNDLE
BANFF
PALLISER
KOOTENAY
MT. BOGART
U. RUNDLE
L. RUNDLE
RUNDLE
BANFF
PALLISER
RUNDLE
MT. SPARROWHAWK
BLAIR.
KOOTENAY
MINE
DUMP
KOOTENAY
FERNIE
RIBBON
CREEK


MT. SPARROWHAWK
BLAIR.
KOOTENAY
MT. ALLAN
BLAIRMORE
FERNIE
RUNDLE
MINE
DUMP
KOOTENAY
TRIASSIC
KOOTENAY
FERNIE
ROCKY
MOUNTAIN
RIBBON
CREEK

STOP NO. 2


TRUNDLE
BANFF
PALLISER
FAIRHOLME
MOUNT INVINCIBLE
MOUNT WARSPITE
LOWER KANANASKIS LAKE

STOP NO. 3

Stop 3 is made at Elpoca Creek bridge (Mile 35). This is a good vantage point overlooking the Kananaskis Lakes. It is an ideal spot for taking panoramic views of the mountain range to the west.

STOP 3 - Ruth Thompson

From the bridge crossing at Whiteman Creek you may look across the valley filled with the soft Mesozoic sands and shales, to Mount Warspite, flanked on the south by Mount Invincible, and on the north by Mount Black Prince. Lower Kananaskis Lake lies at the foot of Mount Invincible and Mount Indefatigable.

Many of the names of the mountains in this area are derived from ships and men who fought at the battle of Jutland. The silhouettes of these mountains are typical of many found in the Banff Area.

From the topography, the result of differential weathering of the rocks, the Paleozoic formations may be identified from a distance.

At the summit of Mount Warspite is the cliff forming Rundle formation. This is the formation that caps Mount Rundle on the Banff Golf Course. It is from a porous zone in this formation that the oil at Turner Valley and the gas at Jumping Pound are produced.

The gentle slopes at the base of these cliffs are Banff formation outcrops, composed of softer argillaceous limestones and shales which are more easily weathered.

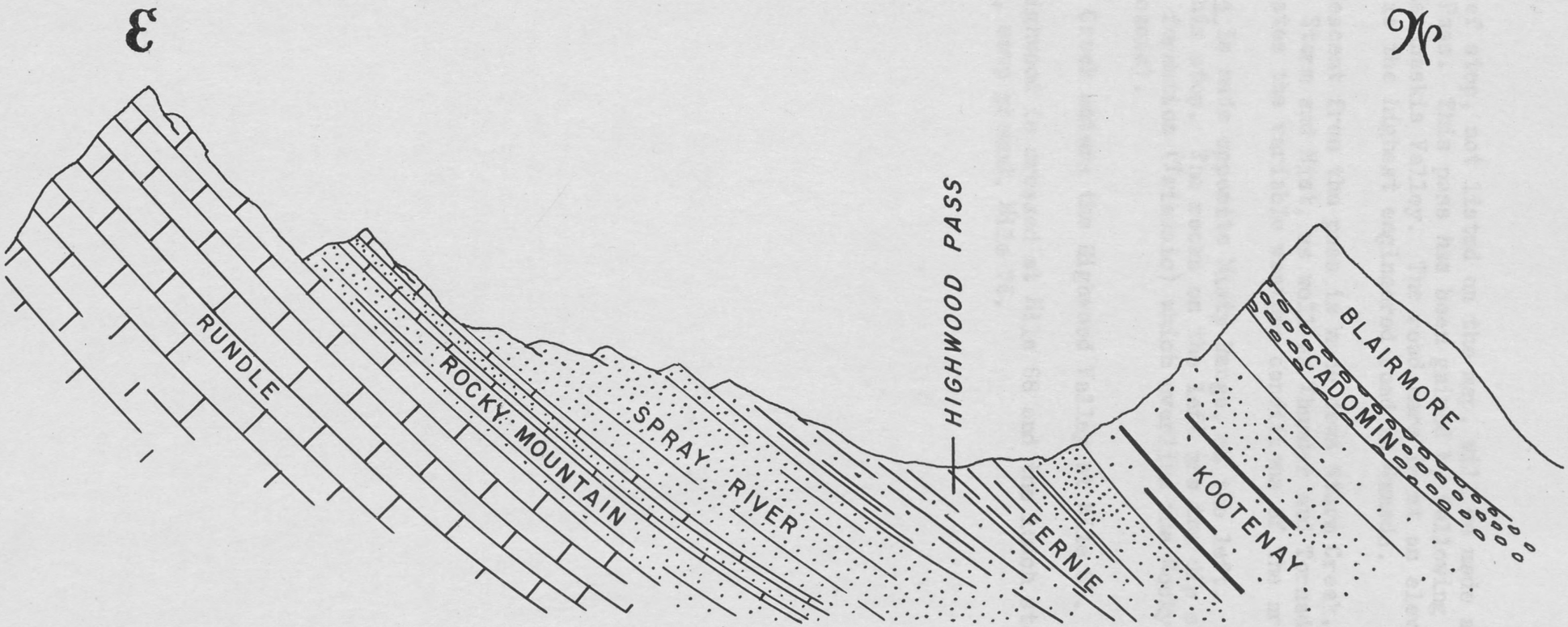
Beneath is the Devonian Palliser formation, which forms the precipitous eastern mountain faces in this general area. On the surface of the brown to buff mottled dolomite limestones which compose this formation characteristic tracery is often found. From a reef in this formation, Shell is producing sulfurous gas at Okotoks.

At the base of the mountain, partially covered by talus, the broken rock along the slopes, is the Fairholme formation. The reefs in the green shale basin were growing at the time the tight bedded dolomite in this area was being deposited in a much shallower quieter sea.

These Paleozoic rock have been thrust over Cretaceous and Jurassic shales and sandstones. The average dip of the thrust fault is 45° away from the viewpoint. Flying over the area you can see that Mount Warspite and Mount Invincible are aligned with the Goat Range and Sulfur Mountain of Banff, and form part of the same thrust sheet. The Misty Hills, which will be seen at Stop 4, are a part of another thrust sheet to the forefront of this one.

On the highway between these two stops you will pass through a pass in the High Rock Range of the Rocky Mountains, over lower Cretaceous and Jurassic sands and shales to a wedge of Spray River rocks which lie along the Western edge of the Misty Range. It was Spray River rocks from Lake Minnewanka which were used to build the Banff Springs Hotel.

HIGHWOOD PASS SECTION



Facing south, the mountains on the left are the Highwood range. From left to right the formations shown on the above sketch section may be identified by color as follows: the blue-grey rocks on the peaks are the Rundle; overlying the Rundle is the Pennsylvanian Rocky Mountain formation which is seen here in the greenish-weathering "flatirons" in the dip slope of the Mountains; the buff beds at, and just above vegetation are the Spray River formation. The Fernie-Kootenay sequence underlies the saddle of the pass and the saddle immediately to the south. The ridge on the right and straight ahead are formed by the resistant Cadomin and Blairmore conglomerates of lower Cretaceous age.

HIGHWOOD PASS SECTION
BLAIRMORE
CADOMIN
KOOTENAY
PENNIE
SPRAY RIVER
ROCKY MOUNTAIN
RUNDLE

3

A brief stop, not listed on the map, will be made at Mile 48 in the Highwood Pass. This pass has been gained by following Pocaterra Creek from the Kananaskis Valley. The road here is at an elevation of 7239 feet. This is the highest engineered road in Canada.

The descent from the pass is made down Storm Creek. The names applied here, Storm and Mist, as well as Thunder and Tornado to the south, illustrates the variable weather conditions of the area.

Stop 4 is made opposite Misty Range, on the left. No diagram accompanies this stop. The rocks on the left are the dip slope of the Spray River formation (Triassic) which overlies the Rocky Mountain formation (Paleozoic).

Storm Creek enters the Highwood Valley at Mile 55.

The Highwood is crossed at Mile 68 and the lunch stop made at Cataract Creek, camp ground, Mile 76.

Longview cut-off to Turtle Mountain.

From the Longview cut-off the road progresses along beds of Blairmore strata for a distance of some 15 miles. To the left is the Livingstone Range (front range) and to the right are rocks of Upper Cretaceous age.

This general area is the scene of the great Highwood fire of 1936 and young pine is slowly replacing the burnt timber.

At the Cataract Creek bridge, Mile 76, a good view is afforded to the right up Cataract Creek where the High Rock Range and Great Divide may be observed. To the left is Mt. Burke (Elev. 8340') with the forestry lookout on the top.

At approximately this point the road begins to swing east and cuts across Jurassic (Fernie) and Lower Cretaceous (Kootenay) rocks for some two miles and then passes into rocks of Mississippian (Rundle) age.

To the north (left) of the road Mississippian rocks may be seen as the surface expression of a large anticline (Savanna Creek anticline). Two wells - Anglo-Canadian Savanna Creek #1 and Husky Northern Target Savanna Creek #1 - were drilled on this anticline. (Mile 86).

STOP #5:

Savanna Creek Anticline - D. Bossort, Texaco Exploration.

The Savanna Creek Structure forms a link between the Highwood Range to the north and the Livingstone Range to the south. From west to east the Savanna Creek Structure is composed of (1) a broad dome of Rundle limestone which forms Plateau Mountain in the southern end of the Highwood Range, (2) a syncline occupied by the headwaters of the Livingstone River, and (3) the steeply dipping east flank of the syncline in which the Rundle limestone rises sharply to the east to form Hailstone Butte in the northern end of the Livingstone Range. (See Stop #5, Figures 1 and 2).

Two wells have been drilled on the Savanna Creek Structure. The first well, Anglo-Canadian Savanna Creek #1, was drilled in late 1938-39, as a Devonian test. At a depth of 40 feet the well faulted into Upper Cretaceous and was abandoned at a total depth of 3375 feet in the Blairmore. Mr. J. C. Scott, of Husky Oil and Refining Ltd., compared the results of the well with the habits of folded faults he had observed elsewhere in the mountains and foothills and concluded that a prospective structure in the Rundle limestone was present at depth beneath the Savanna Creek Structure. A second well, Husky Northern Target Savanna #1, was drilled in 1952. The well encountered the Rundle at depth as predicted, but before penetrating the prospective porosity in the Rundle, faulted to the Lower Cretaceous and was suspended at a total depth of 5575 feet.

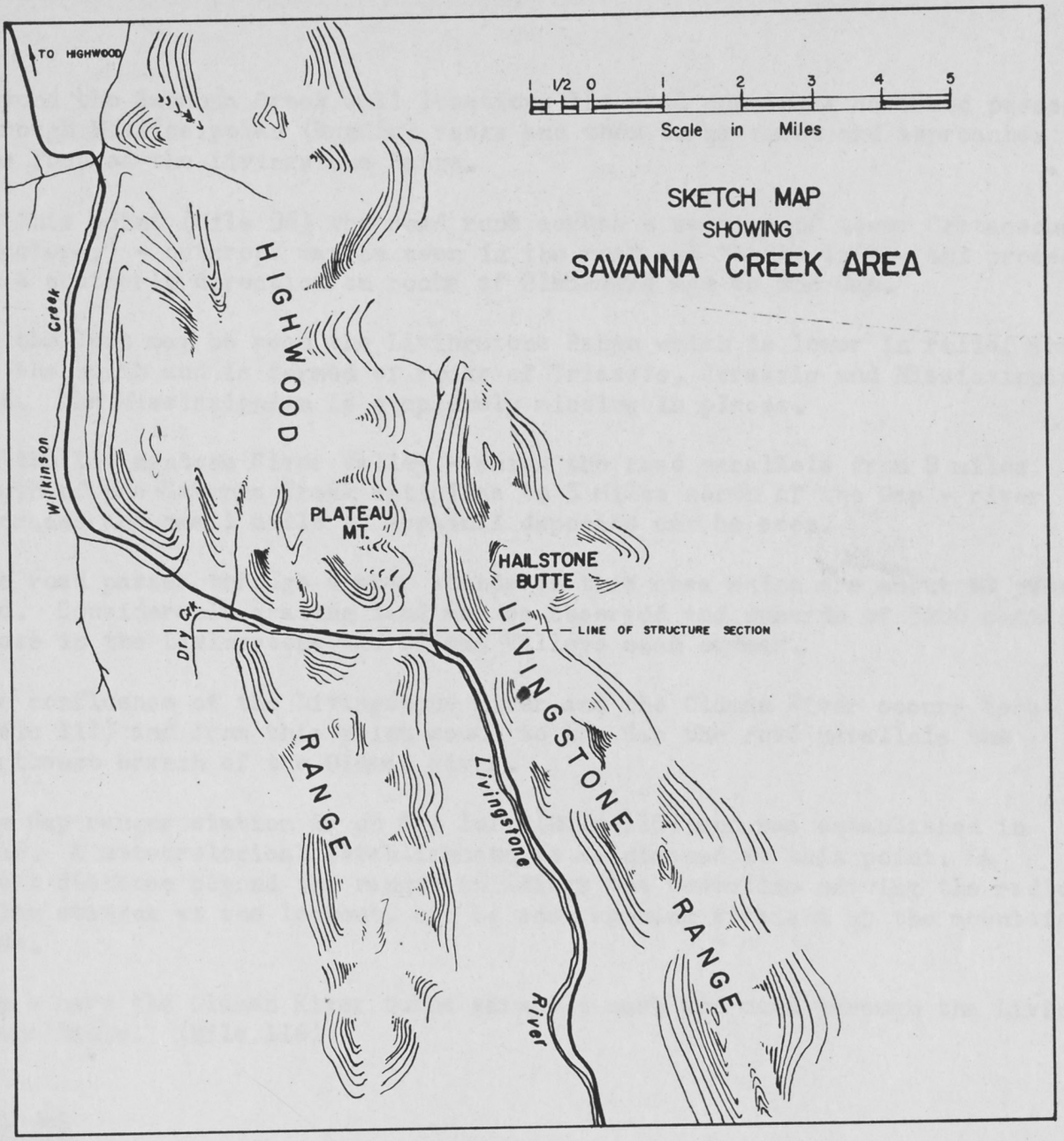
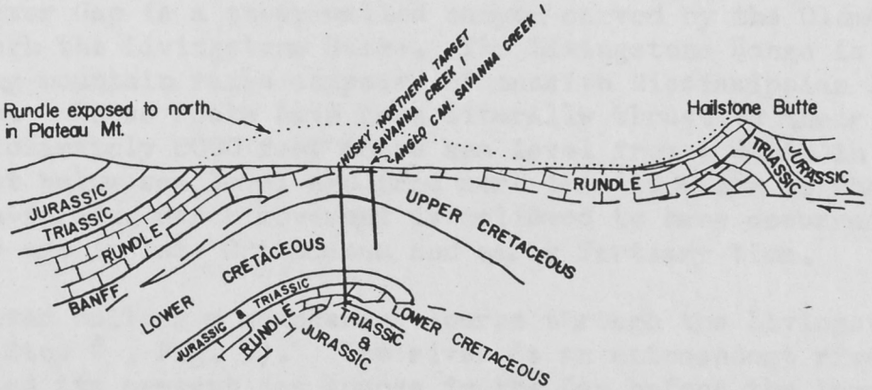


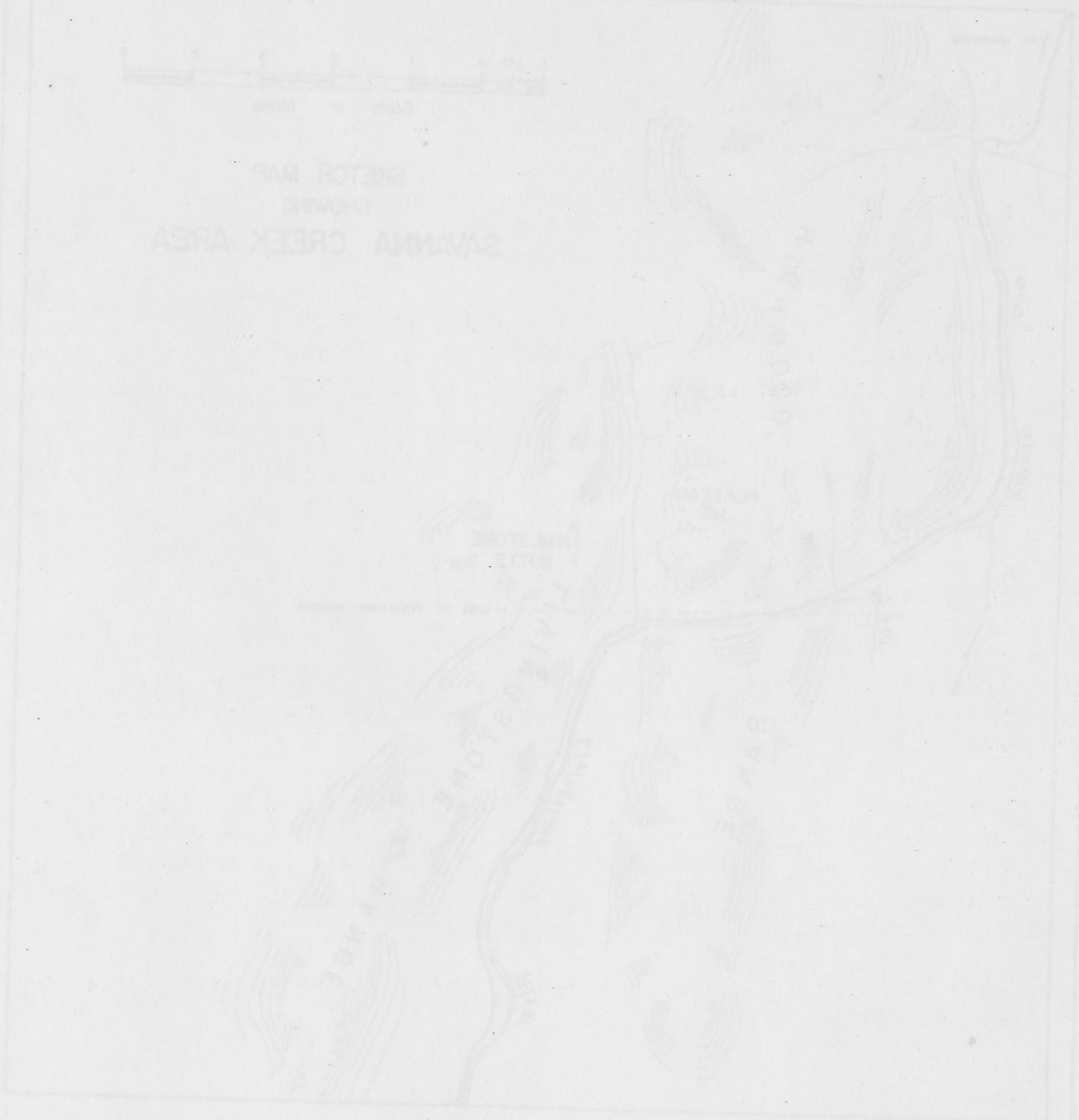
FIGURE 1.

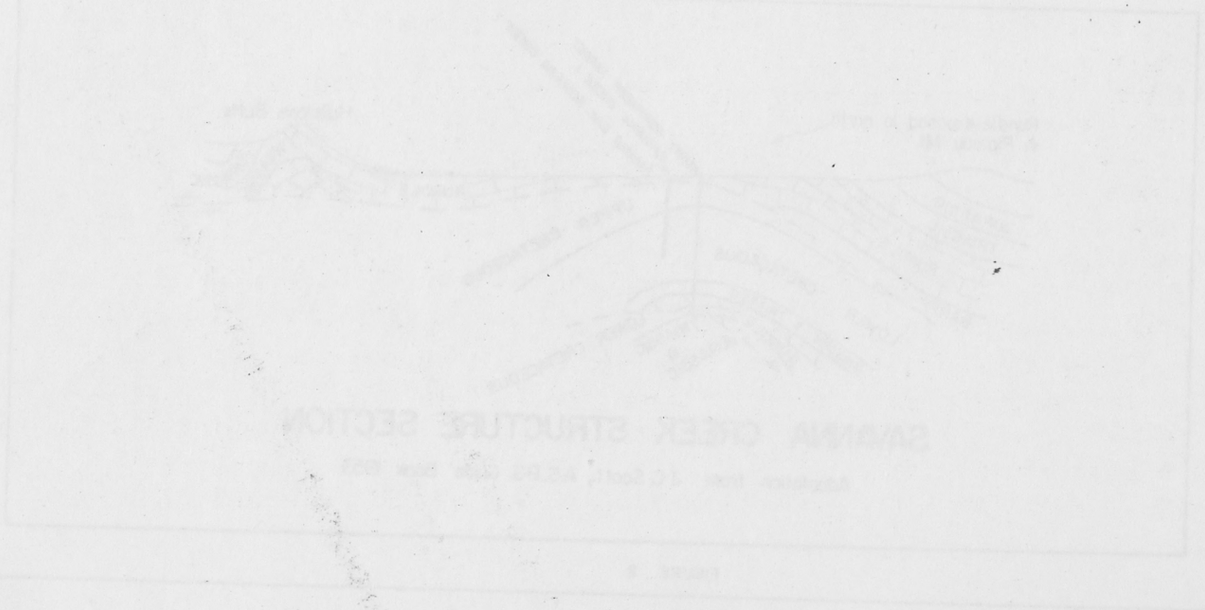


SAVANNA CREEK STRUCTURE SECTION

Adaptation from J.C. Scott, A.S.P.G. Guide Book 1953.

FIGURE 2.





Beyond the Savanna Creek well locations the road continues east and passes through Mississippian (Rundle) rocks and then turns south and approaches the foot of the Livingstone Range.

At this point (Mile 96) the road runs across a section of Lower Cretaceous (Kootenay) - outcrops may be seen in the road cut to the left - and proceeds in a southerly direction on rocks of Blairmore age to the Gap.

To the left may be seen the Livingstone Range which is lower in relief than to the north and is formed of rocks of Triassic, Jurassic and Mississippian age. The Mississippian is completely missing in places.

In the Livingstone River Valley - which the road parallels from 8 miles south of the Savanna Creek anticline to 5 miles north of the Gap - river terraces and small hills of morainal deposits can be seen.

The road passes through timber stands in this area which are about 80 years old. Considerable grazing land may be observed and upwards of 3200 cattle graze in the Livingstone and Oldman Valleys each summer.

The confluence of the Livingstone River and the Oldman River occurs here (Mile 111) and from this point south to the Gap the road parallels the northwest branch of the Oldman River.

The Gap ranger station is on the left (Mile 115) and was established in 1916. A meteorological establishment is maintained at this point. A short distance beyond the ranger buildings the powerline serving the radio-relay station at the lookout, can be seen running straight up the mountain-side.

Gap - here the Oldman River turns abruptly east and cuts through the Living-stone Range. (Mile 116).

STOP #6

Geology of the Gap - D. Bossort

The Oldman River Gap is a steep-walled canyon carved by the Oldman River passing through the Livingstone Range. The Livingstone Range is a north-south trending mountain range composed of massive Mississippian limestones and dolomites. These rocks have been literally thrust to their present position approximately 8000 feet above sea level from a depth in excess of 15,000 feet below sea level and from more than 10 miles to the west. This mountain-forming earth movement is believed to have occurred some 60 million years ago in late Cretaceous and early Tertiary time.

The Oldman River follows a meandering course through the Livingstone Range. (See Stop 6 , Fig. 3). The river is an antecendent river, that is, it occupied its present day course in the Gap before the inception of the range and was able to maintain its course by erosion despite the growth of the Livingstone Range, giving some indication of the length of time in-volved in the growth of a mountain range. In late Pleistocene time the

FIGURE 1

Looking south towards Thunder Mountain from north of The Gap. In central forground is overturned Livingstone anticline in basal Rundle and core of Banff. Gap syncline passes through crest of Thunder Mountain; Gap anticline and fault to right. Glacial cirque developed along Gap syncline.

View North from road through Oldman River Gap showing West dipping Triassic and Mississippian strata. The Banff is here identified as being at the base of the Massive basal cliff forming member of the Rundle.

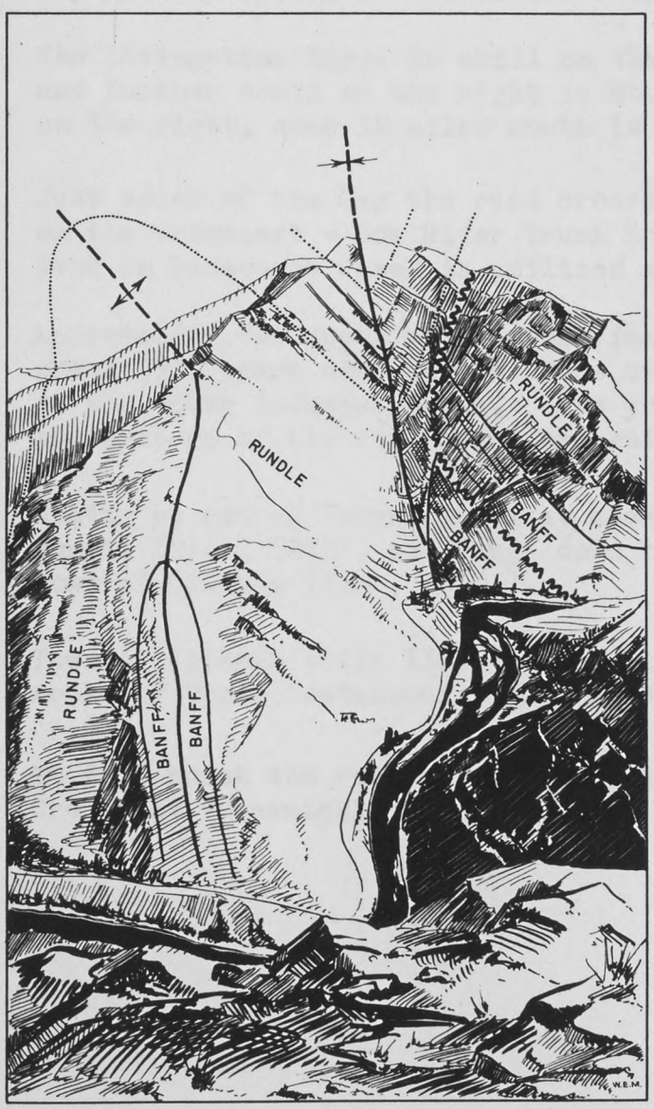


FIGURE 2

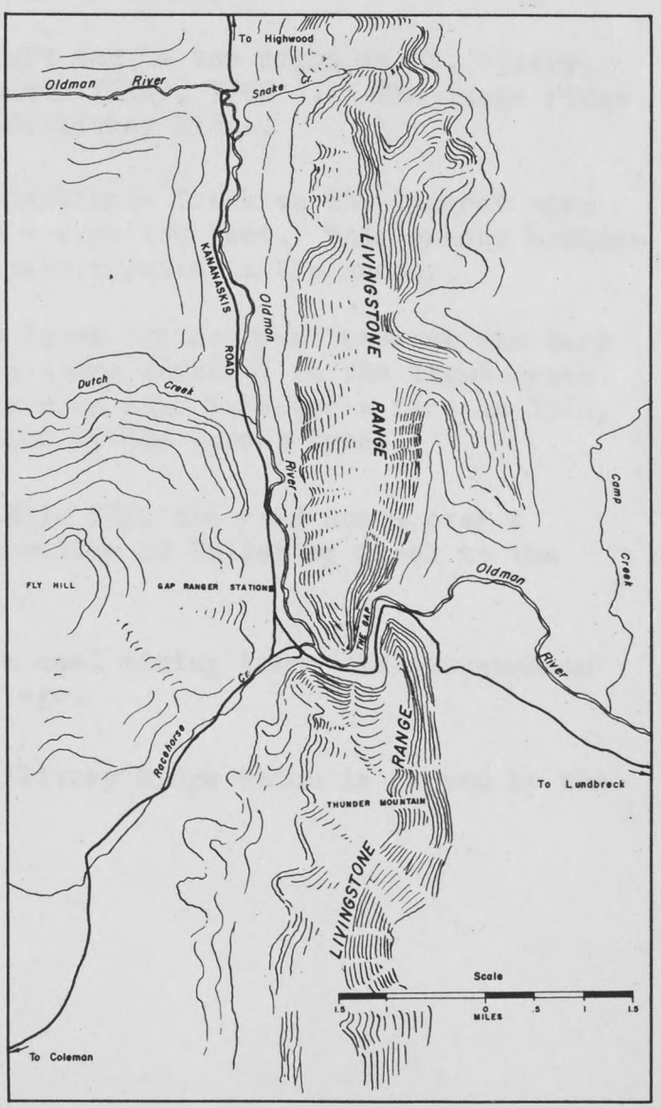


FIGURE 3

Oldman River Gap was choked with glacial ice. The ice formed on the west flanks of the Livingstone Range, on the Highrock Range to the west, and on the intervening hills, coalesced, and flowed down the main valleys, converging on the Gap.

On the west side of the Livingstone Range the present-day canyon walls of the Gap display excellent exposures of the entire Rundle limestone section, some 1700 feet thick; its upper contact with the Rocky Mountain formation, and its lower contact with the Banff formation. (See Page 2, Fig. 1)
In the central part and eastern side of the Livingstone Range the normal succession of the strata is interrupted and repeated by steep faults and tight and overturned folds resulting from the "drag" of the strata along the fault or line breakage along which the strata travelled to their present position. (See Page 2, Fig. 2).

Proceeding south from the Gap the road runs in a south-westerly direction and parallels Racehorse Creek for about 3 miles and Vicary Creek for about 13 miles. Rocks of Blairmore age are traversed for a distance of 7 miles and then the road swings south through Upper Cretaceous (Blackstone, Cardium, Wapiabi and Crowsnest Volcanics) rocks for 18 miles.

The Livingstone Range is still on the left and to the right is Mt. Vicary, and further south on the right is Mt. Butte (Elev. 7766'). The large ridge on the right, some 12 miles south is McGillivray Ridge.

Just south of the Gap the road crosses Racehorse Creek on the longest span on the Crowsnest - Bow River Trunk Road - some 140 feet. This grassy bottomland in Racehorse Creek is utilized as cattle range in the summer.

Approaching the upper reaches of Vicary Creek the contrast between the dark green (275 years old) spruce shows up in sharp contrast to the light green of the young lodgepole pine. The young pine came in after a fire in 1910, the pattern of the fire being recognizable by the forest types.

Coming up out of Vicary Creek at about Mile 133, the road comes over a summit (Elev. 5868') and drops down the valley of Pelletier Creek to the town of Coleman (Elev. 4500').

Town of Coleman (Mile 138) - basically a coal mining town - is situated on rocks of Upper Cretaceous (Belly River) age.

At this point the road passes over McGillivray Ridge which is capped by the Crowsnest Volcanics.

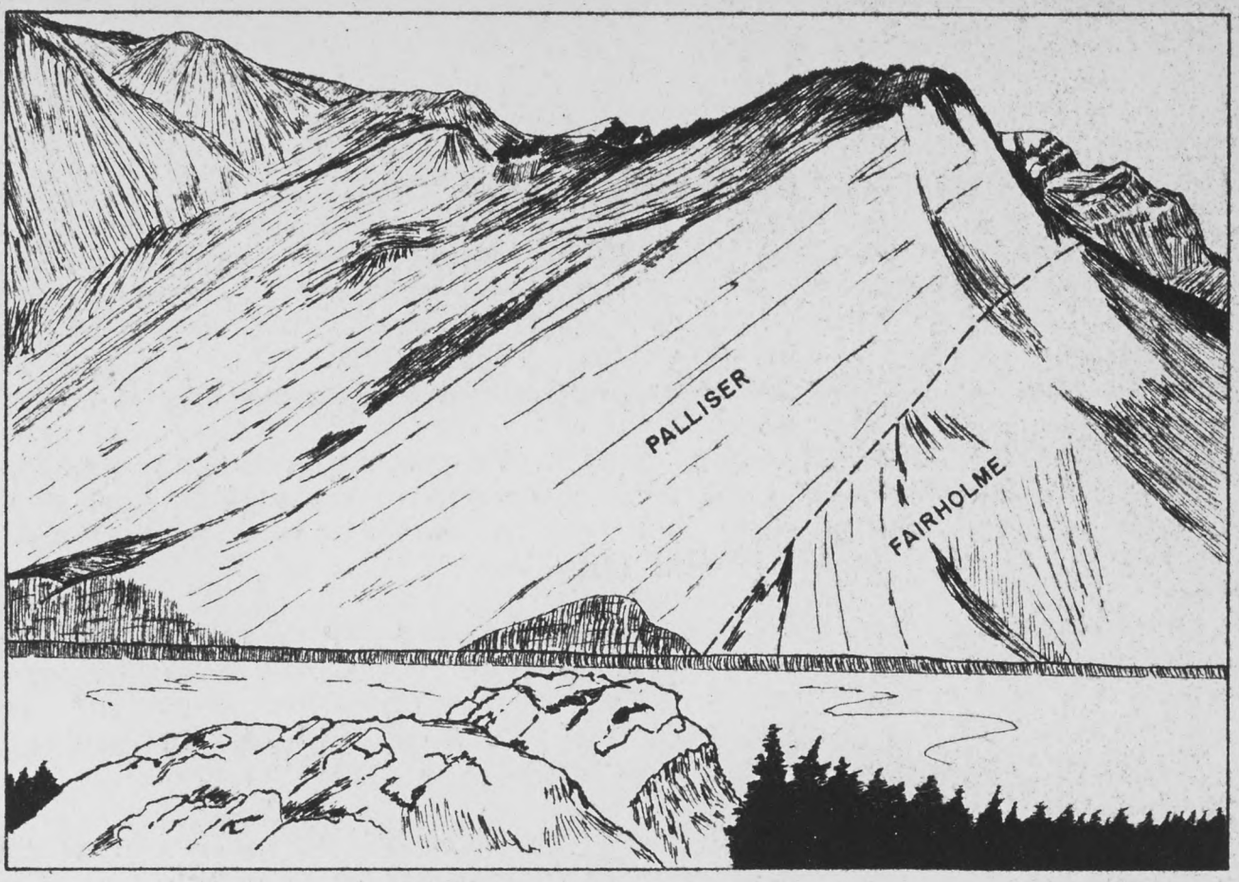


FIGURE NO. 2
STOP NO. 8
Sketch looking north across Crowsnest Lake

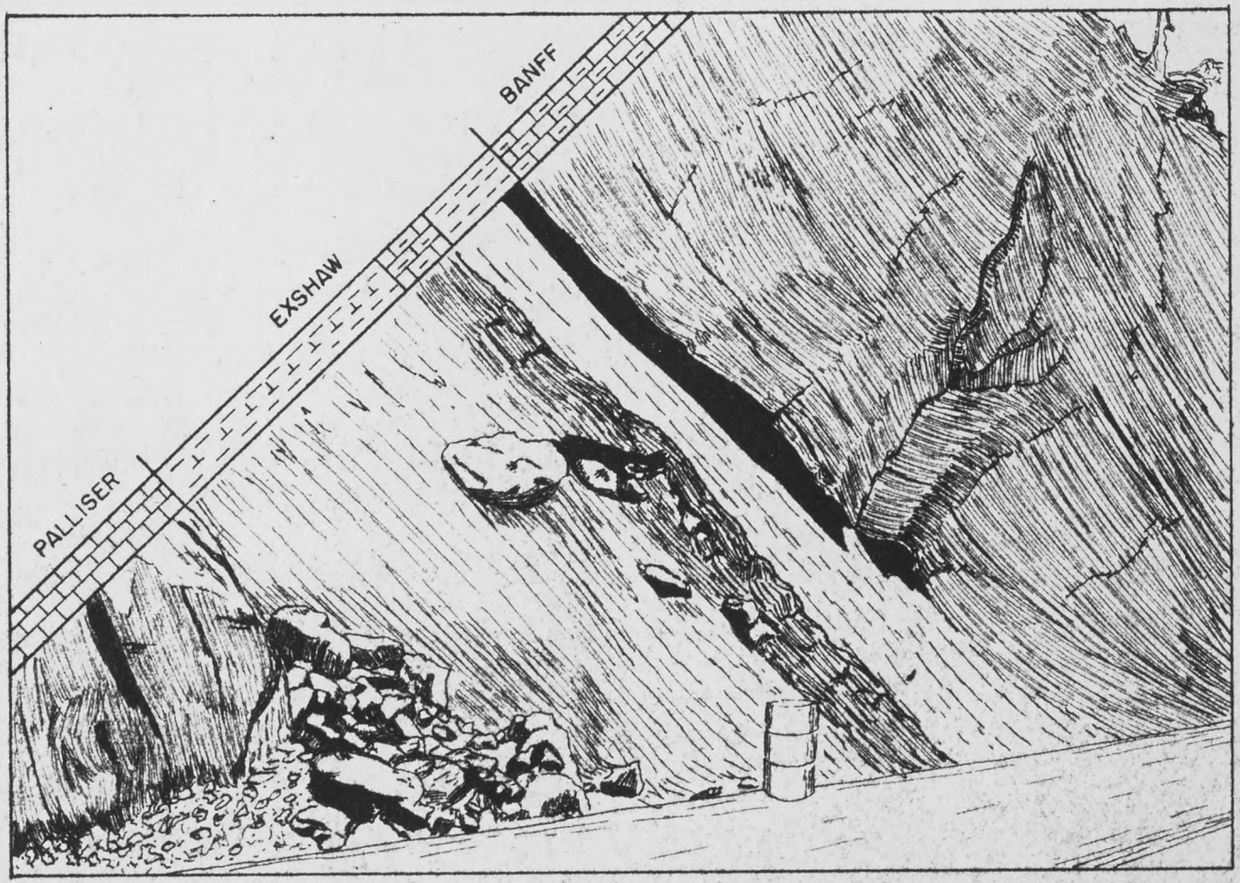


FIGURE NO. 1
STOP NO. 8
Banff-Exshaw contact on south side of road at Crowsnest Lake

STOP 7 - Crowsnest Volcanics - D. E. Duff

The Crowsnest Volcanics are one of the few known occurrences of igneous rocks in the foothills and front ranges of the Rocky Mountains of Alberta, and are found only in the Crowsnest Pass area. Some phases of the Volcanics are more highly resistant to erosion than others and this factor allows the Volcanics to form prominent ridges throughout the area.

The Volcanics occur within the Upper Cretaceous succession between the Blairmore formation and the overlying Blackstone formation. They attain a maximum thickness of about 1100 feet in the vicinity of Coleman and thin in all directions from this point.

Essentially the formation is a series of igneous breccias, volcanic tuffs and occasionally some flow rocks. There is no apparent uniformity in the sequence of the rock types from place to place and many of the beds are lenticular. The rock type varies from fine-grained highly feldspathic tuffs to very coarse heterogeneous breccias of explosive ejecta.

The stratified nature, roundness of fragments and the occurrence of coal in the Volcanics indicate shallow water deposition. Absence of flow indicates an eruptive source and when the areal extent and thickness is considered the source was probably a series of small eruptive cones.

The formation appears to have an upper Lower Cretaceous age and it has been suggested that these intrusives mark an early phase of the Laramide Revolution.

Proceeding west along No. 3 highway the road passes over Upper Cretaceous (Alberta and Belly River) rocks. The large mountain to the right is Crowsnest Mountain (elev. 9138'). The mountain is an erosional remnant (inlier) of the main Rocky Mountain Range (Stop 8 - Fig. 3). The Flathead or First Range of the Rockies is located ahead and to the left.

Paralleling the highway is the Crowsnest River which has its source to the west and flows east from the Great Divide at Crowsnest (elev. 4459') - summit of the railway.

To the right, just prior to Stop 8, are the Crowsnest Lakes (elev. 4427'). These lakes are remnants of glaciation. On either side of the Lake are rocks of Mississippian (Banff, Rundle and Exshaw) and Devonian (Palliser and Fairholme) age overlying Upper Cretaceous (Belly River).

STOP 8 - Geology in Vicinity of Crowsnest Lake - D. E. Duff

In this area the Devonian and Mississippian rocks are very well exposed on the north side of Crowsnest Lake (Stop 8 - Fig. 2). Good outcrops of the upper part of the Devonian - including Palliser, Mount Hawk and Perdrix formations - are readily observed. At this locality the Exshaw and Banff can also be seen in excellent outcrops (Stop 8 - Fig. 1).

The Devonian in this area has been divided into Palliser and Fairholme.

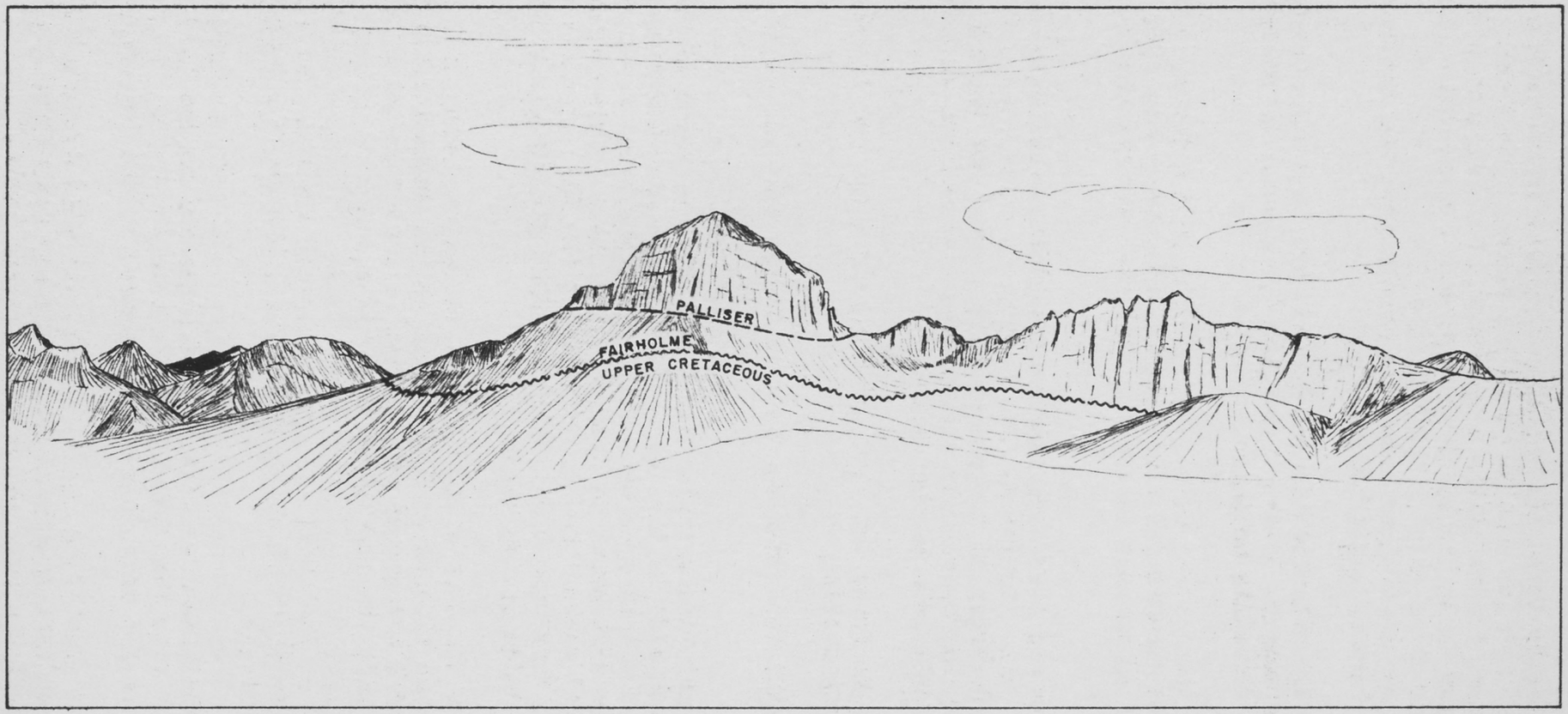


FIGURE NO. 3

STOP NO 8

Sketch looking northwest to Crowsnest Mountain
from highway west of Coleman

The Palliser in this area has been divided into two members - the upper called the Costigan and the lower the Morro. These correlate with the D1 or Wabamun of the plains of Alberta. The Palliser is seen as the cliff-forming gray to dark gray limestone, and is about 900' thick.

The Fairholme is divided into four groups from the top down, being Alexo, Mt. Hawk, Perdrix and Flume.

The Alexo directly underlies the Morro and is correlated with the Graminia and Calmar members of the Winterburn formation. Lithologically it is a thinly bedded silty dolomite.

The Mount Hawk is represented by a light gray coarsely crystalline, massive bedded dolomite with porosity. This correlates with the Nisku (D2 reef zone) of the plains and the uppermost part of the Ireton or Green Shale.

The Perdrix and Flume are represented by the underlying series of dolomites and dark limestones. The Perdrix is correlated with the Ireton, Leduc and Duvernay of the plains area. The Flume formation - of which only a part may be seen in the outcrop - correlates with the Cooking Lake and Beaverhill Lake of the plains.

The Fairholme forms the lower more gentle slope and is some 1700' in thickness at this locality.

The Mississippian rocks may be seen to the west and on the south side of the lake.

The lowermost Mississippian bed is the Exshaw, which is right off the road on the south side of the lake. It consists of a lower band of black shale 28' thick overlain by a hard black limestone,which is in turn overlain by 18' of more dark brown to black fissile shale. This sequence here is similar to that encountered in drilling in the Williston Basin. In the Basin the Bakken formation consists of two dark gray to black shale bands separated by a dolomitic siltstone.

Lying above the Exshaw is the Banff formation, about 700' in thickness. It is a sequence of dark gray calcareous shales which weather brown,and becomes more and more calcareous until, with many repetitions of shale and limestone, it merges with the overlying Rundle limestone.

The Rundle is the overlying gray limestone which may be seen to the west. At Crowsnest Lakes it is about 3400' thick, but at Blairmore it is only about 1600' in thickness.

The Crowsnest Lakes are remnants of a glacial tongue that swept down the Crowsnest Valley from the alpine glaciation to the west. The barriers at the front of the lakes are partially moraine dumped by the retreating ice tongue.

Evidence of glaciation may be seen in the well developed knife-edge ridges, erratic boulders, truncated spurs, and cirques on the higher peaks of the Rocky Mountains proper and the Livingstone Range.

Returning east, we pass again through the town of Coleman. The large ridge to the right, and south of the town of Coleman, is Ash Ridge.

Several of the coal mines may be observed to the right and left of the road. Some of these underground workings extend several miles into the side of the Ridge.

Proceeding east from Coleman the road traverses over Upper Cretaceous rocks for about one mile and then over Blairmore rocks into the west end of the town of Blairmore.

A large band of Kootenay (Lower Cretaceous) passes through Blairmore town, and several large mine workings may be seen on the left.

Toward the east end of Blairmore the road passes over Fernie (Jurassic) rocks and ahead two mountains are present - the gray colored rocks of Mississippian age. The mountain to the left is Bluff Mountain and the one on the right is Turtle Mountain.

This Mississippian fault block is referred to as the Turtle Mountain anticline and the road passes through the Mississippian and back into rocks of Kootenay and Blairmore age to the town of Frank.

TURTLE MOUNTAIN PLAYGROUND

END OF FIRST DAY.

.....

START OF SECOND DAY.

East from the town of Frank the road travels a short distance over rocks of Blairmore age and then on the debris of the Frank Slide.

STOP 9 - Viewpoint on Frank Slide. - D. E. Duff

Copy of inscription at viewpoint:

"Disaster struck here at 4:10 A.M., April 29, 1903. A gigantic wedge of limestone, 1300 feet high, 4000 feet wide and 500 feet thick, crashed down from Turtle Mountain and destroyed the town of Frank. Seventy million tons of rock swept over two miles of valley, taking 60 lives and burying numerous homes, the mine and railway, along with 3200 acres of fertile land, to a depth of 100 feet in 100 seconds."

General:

Turtle Mountain is interesting in that it is the site of the Frank slide and also is the area from which the "Pass" got its name.

Turtle Mountain received its name from the Blackfeet, who believed the mountain to be slowly moving and would some day descend on the valley.

There is, as mentioned above, a historical connection with Turtle Mountain and the derivation of the naming of the "Pass".

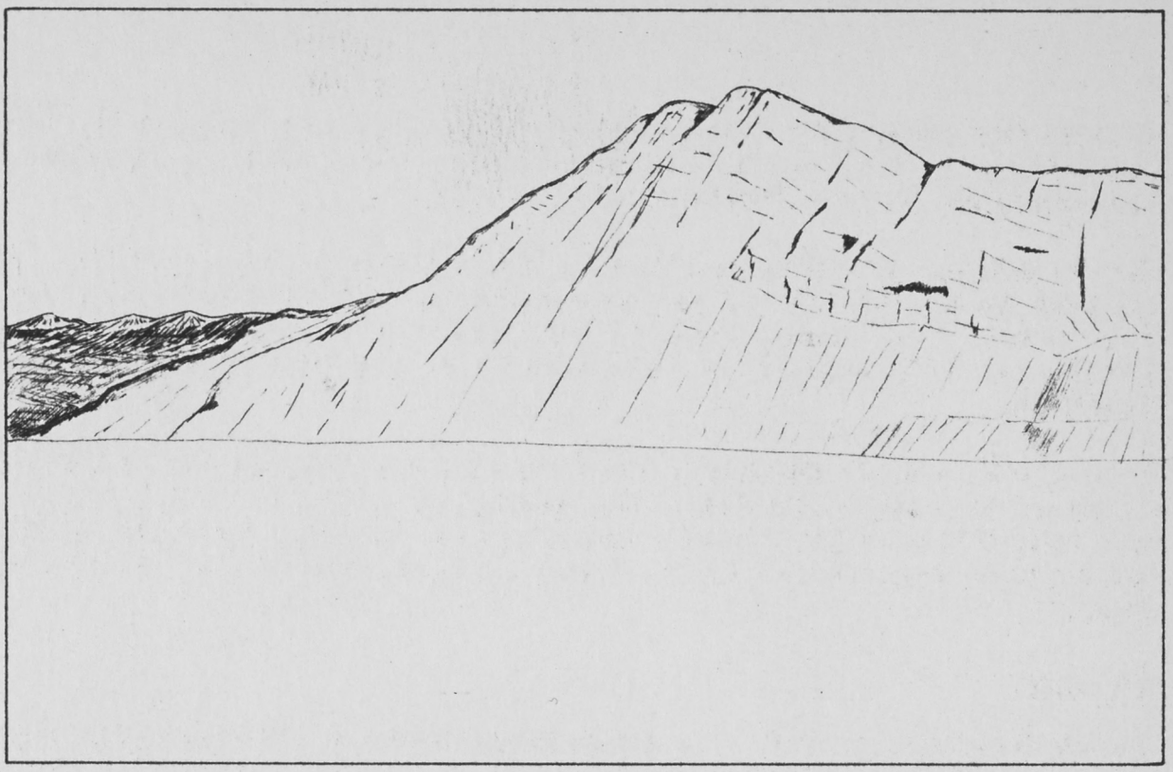


FIGURE NO. 1

STOP NO. 9

Sketch looking south at Turtle Mountain prior to slide

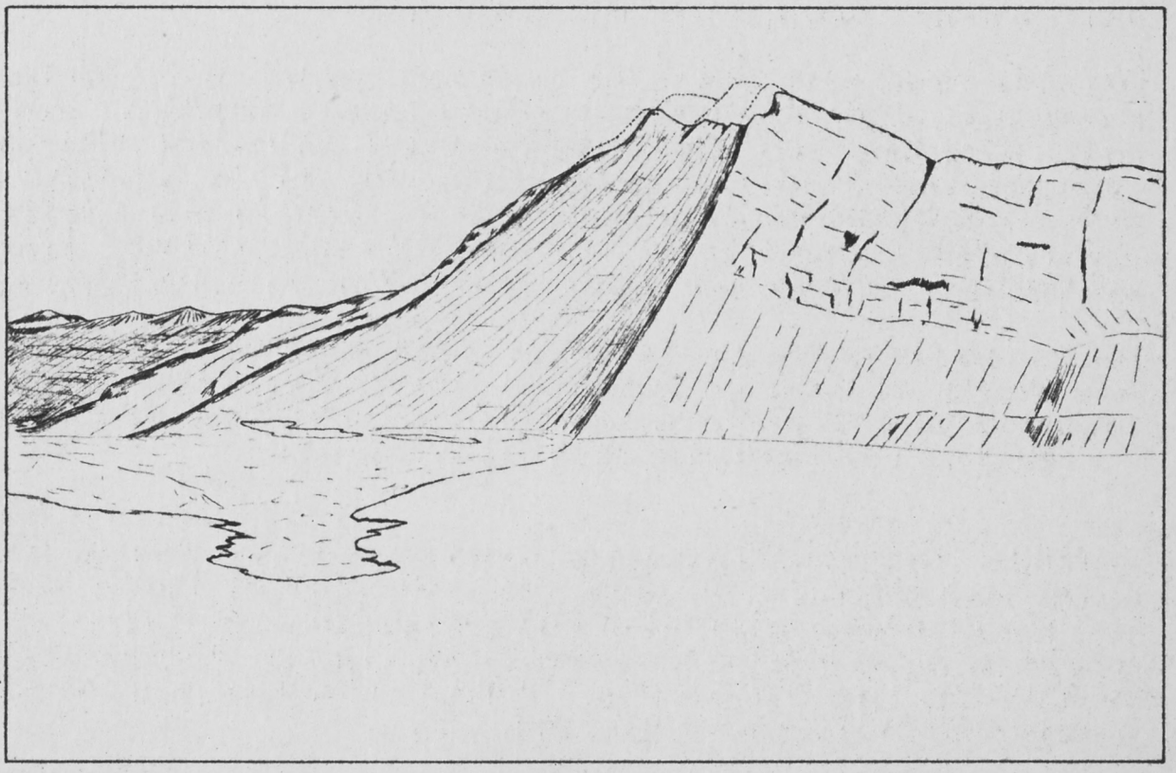


FIGURE NO. 2

STOP NO. 9

Sketch at same place as above after slide

During the years 1852-1854 the Blood, Blackfeet and Peigan were living peacefully as the Blackfoot Nation, and had their camp during this period where the City of Lethbridge now stands.

To the south, in the United States, lived the Crows who for some time, unknown to the Blackfeet, had been coming across the border and stealing horses. The depradations of the Crow were discovered and the Blackfeet prepared to attack the Crow marauders, who were encamped under Turtle Mountain.

A battle ensued in which all the Crow were annihilated and the Blackfeet returned to camp victorious. The ambush in which the Crow had been caught was called thereafter "Crow's Nest" by the Indians. The site of the battlefield is now covered by the Frank slide and was called "Crow's Nest Pass."

Geology:

Turtle Mountain is part of a large fault block of Mississippian (Rundle), and Goat or Bluff Mountain, to the north of Turtle Mountain, is the northern extension of the block. This fault block is overthrust on Lower Cretaceous (Kootenay) beds which form a very unstable base. The face of the mountain was perpendicular (Stop 9 - Fig. 1 & 2) and was, and still is, very highly fractured on the top of the face. Today very large cracks and fissures may be observed.

Structurally the Turtle Mountain fold is tight, almost isoclinal, with overturned beds. The underlying Kootenay beds dip to the east, indicating some flattening away from the axis of the fold.

The slide itself was probably due to several causes. Turtle Mountain is a very large block of limestone overthrust on soft sandstones, shales and coal. These lower beds are more easily eroded and erosion would leave large blocks of limestone temporarily suspended with no underlying support. Contributory causes no doubt were the mines which went under the Mississippian and into the Kootenay to tap the coal reserves. Blasting and tunneling would further weaken the base upon which the limestone rested.

The erosion and mining aggravated the situation to the point that the face finally collapsed and caused some seventy million tons of rock to sweep down one side of the valley and partially up the other (Stop 9 - Fig. 3) (Note the lobate edge of the slide debris).

Travelling east from the viewpoint at the Frank Slide, the road travels across the remainder of the slide area and through the town of Bellevue. Coal mining operations are also present at Bellevue and workings may be noticed on either side of the road. To the right of Bellevue is the town of Hillcrest, also a mining town. Just to the west of Hillcrest is the graveyard of the victims of the Frank slide.

From Bellevue to Burmis the road passes over Lower Cretaceous (Kootenay and Blairmore) rocks and small mining operations are to be seen on either side of the road.

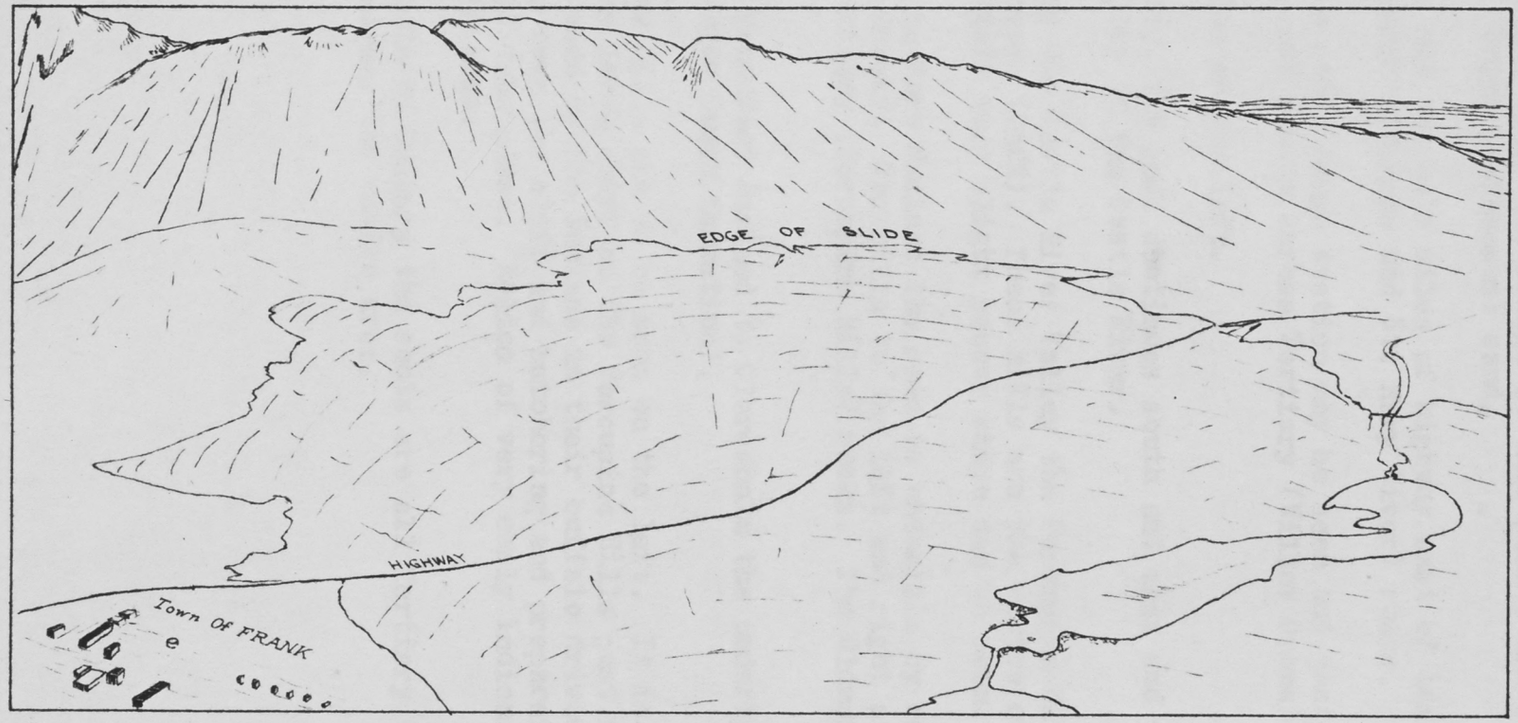
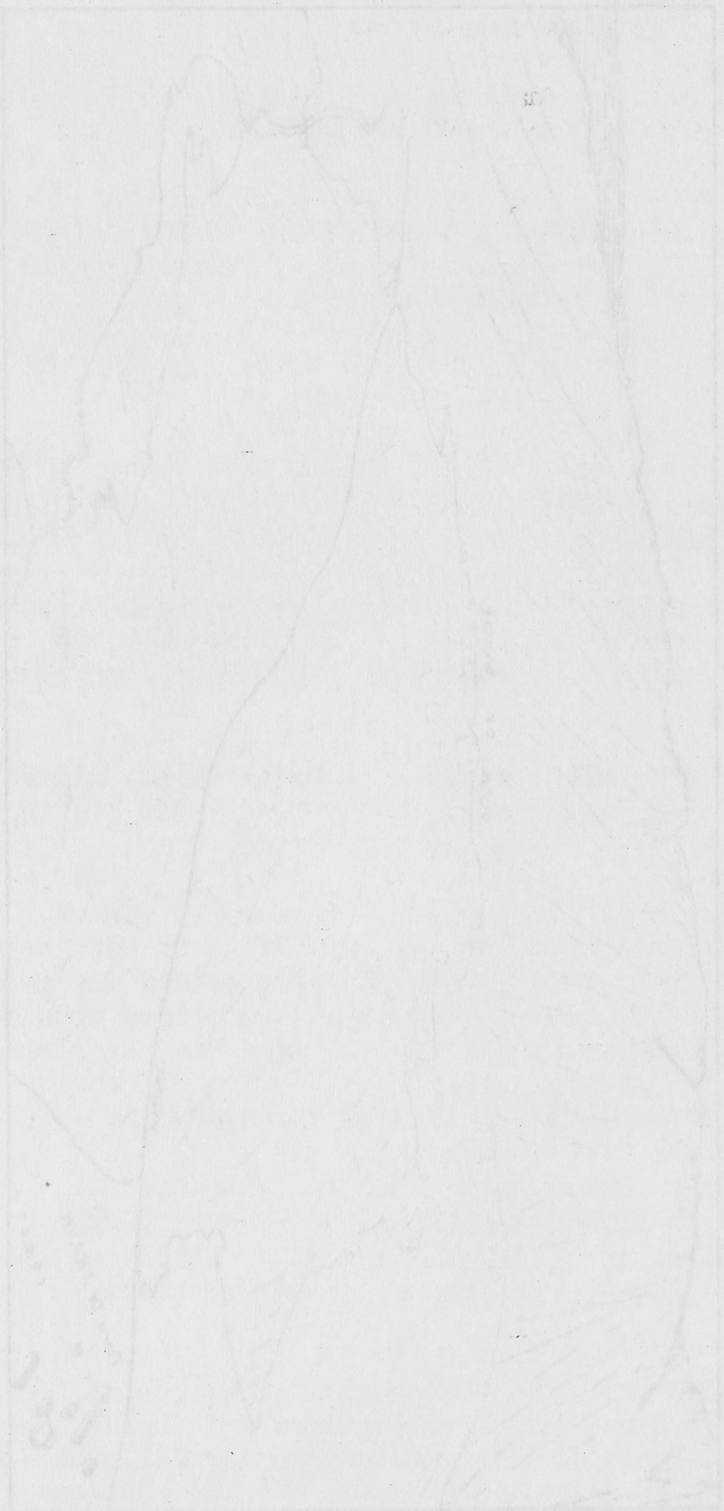


FIGURE NO. 3

STOP NO. 9

Sketch of area devastated as seen from north spur of Turtle Mountain.
This sketch illustrates the formation of terminal lobes
produced by the "splaying" of the material in a great landslide.



Burmis is the site of a magnetite iron discovery which was examined as early as 1911 but has been found to be non-commercial.

Lundbreck Falls, under the bridge at this point, are formed over basal Belly River (Upper Cretaceous) sand.

The next two and one half miles of highway east of Lundbreck pass over Upper Cretaceous (Bearpaw and St. Mary River) rocks.

On the left a radio range station may be seen and just west of this station the road starts across Tertiary (Willow Creek) rocks.

Town of Cowley on the left.

Leaving Cowley, the road continues south and east and proceeds down in the deep valley of the Castle River.

After leaving the Castle River Valley the Porcupine Hills can be seen to the northeast (left). These hills are the centre of the Alberta syncline. Their very slight saucer shape can be seen.

From Cowley to Fort Macleod the road is underlain by rocks of Tertiary age (Willow Creek). The hills to the left and right at Brockett are formed by Tertiary (Porcupine Hills) rocks. The Oldman River parallels the road.

Going north from Fort Macleod to Claresholm the underlying rocks are Tertiary (Willow Creek formation).

The Porcupine Hills are to be seen on the left. It is interesting to note that the large cliff on the Porcupine Hills just northwest of Fort Macleod was used by the Indians in their buffalo drives. The buffalo would be stampeded over the cliff and butchering and preparation of the slaughtered animals would take place. Relics of very early Indian culture have been found in this area.

From Claresholm to Calgary the rocks are all Tertiary (Paskapoo) in age and glaciation covers the entire area.